Hormonal treatment of the bark of rubber trees (Hevea brasiliensis) increases latex yield through latex dilution in relation with the differential expression of two aquaporin genes

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Résumé en anglais	Natural rubber is synthesized in laticifers in the inner liber of the rubber tree (Hevea brasiliensis). Upon bark tapping, the latex is expelled due to liber turgor pressure. The mature laticifers are devoid of plasmodesmata; therefore a corresponding decrease in the total latex solid content is likely to occur due to water influx inside the laticifers. Auxins and ethylene used as efficient yield stimulants in mature untapped rubber trees, but, bark treatments with abscisic acid (ABA) and salicylic acid (SA) could also induce a transient increase latex yield. We recently reported that there are three aquaporin genes, HbPIP2;1, HbTIP1;1 and HbPIP1;1, that are regulated differentially after ethylene bark treatment. HbPIP2;1 was up-regulated in both the laticifers and the inner liber tissues, whereas HbTIP1;1 was up-regulated in the latex cells, but very markedly down-regulated in the inner liber tissues. Conversely, HbPIP1;1 was down-regulated in both tissues. In the present study, HbPIP2;1 and HbTIP1;1 showed a similar expression in response to auxin, ABA and SA, as seen in ethylene stimulation, while HbPIP1;1 was slightly regulated by auxin, but neither by ABA nor SA. The analysis of the HbPIP1;1 promoter region indicated the presence of only ethylene and auxin responsive elements. In addition, the poor efficiency of this HbPIP1;1 in increasing plasmalemma water conductance was confirmed in Xenopus oocytes. Thus, an increase in latex yield in response to all of these hormones was proposed to be the major function of aquaporins, HbPIP2;1 and HbTIP1;1. This study emphasized that the circulation of water between the laticifers and their surrounding tissues that result in latex dilution, as well as the probable maintenance of the liber tissues turgor pressure, favor the prolongation of latex flow.
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